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论文

颗粒弥散铝基纳米合金微结构与力学性能

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摘要： 本文对新型颗粒弥散铝基纳米晶薄带的微观结构、相转变和力学性能作了详细研究.结果表明，随着混合稀土（Mm）含量的增加，快凝al-Fe－V－Si合金α-al晶粒和弥散颗粒不断细化，形成颗粒弥散铝基纳米晶材料.稀土元素在快凝过程中促使亚稳相al8Fe4Mm的形成，抑制α－al13（Fe，V）3Si相的析出.含0.5%和1.0%Mm（原子分数）纳米合金在673K附近al8Fe4Mm转变为α－al13（Fe,V）3Si相.含1%Mm快凝合金形成很细的颗粒弥散纳米晶材料,其断裂强度和疲劳强度比微晶al-Fe－V－Si合金高出1倍，且具有更好的热稳定性.

关键词： 颗粒弥散 纳米晶合金 微观结构 纳米相转变 力学性能

MICROSTRUCTURE AND MECHNICAL PROPERTY OF Al-BASED NANOCRYSTALLINE ALLOYS CONTAINING DISPERSIVE PARTICLES

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Abstract: The microstructure, phase transformation and mechanical property in al-based nanocrystalline alloys containing dispersive particles were studied in detail. It is shown that the sizes of α-al grain and dispersive particles decrease and α-al13(Fe,V)3Si particles in al-Fe-V-Si microcrystalline alloys are substituted by al8Fe4Mm or al20Fe5Mm phase with the increase of Mm content. The transition of metastable al8Fe4Mm to stableα-al13(Fe,V)3Si phase takes place near 673 K. In addition, 1.0%Mm nanocrystalline alloy exhibits 2 times higher strengthes in tensile fracture and fatigue fracture than al-Fe-V-Si microcrystalline alloy, and has more better thermal stability.

Keywords: dispersive particle nanocrystaline alloy microstructure phase transformation mechanical property

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